Oxford Cambridge and RSA

A Level Biology A

H420/02 Biological Diversity

Question Set 16

1 The Lake District is the largest National Park in England, covering an area of 2362 km^2.

It contains a wide variety of species, some of which are under threat or endangered. The residenthuman population is 41 000. In 2016 the Lake District received 18.4 million tourists.

The proportion of Lake District land used for different purposes is shown in Fig. 18.

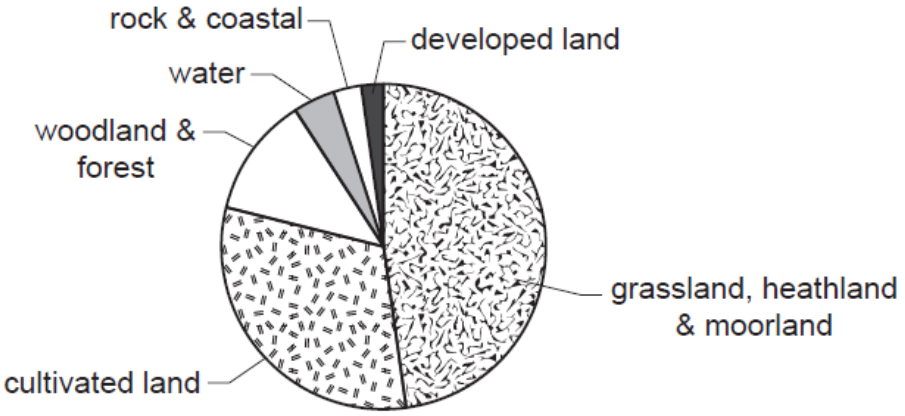

Fig. 18

(a) Explain **one** way in which tourists can lead to an increase in the biodiversity of an area. Increase funding for conservation groups. Funding allows them to restore ecosystems and increase habitat and species biodiversity. **[2]**

(b) The Lake District contains large areas where timber is produced. One of the aims of themanagement of National Parks is to produce timber sustainably.

(i) Using Fig. 18, **estimate** the percentage of land that is covered by woodland and forest.

$\approx \frac{1}{8} \times 100$ estimate = ... 12.5 ..... % **[1]**

(ii) Timber can be produced economically by a technique called clear felling. Clear felling can damage biodiversity.

Explain how it is possible to produce timber sustainably using clear felling.

By allowing time for new trees to fully grow before next felling or by limiting the size of area that is felled. **[2]**

(iii) A traditional timber-production process that is still used in parts of the Lake District iscoppicing.

Describe the process of coppicing **and** explain the potential benefits of coppicing to the biodiversity of a woodland.

Coppicing is cutting deciduous trees close to the ground level to encourage growth of new shoots from cut surface. Then young shoots are protected from grazers and the shoots are left to regrow. Later cut the newly grown shoots and repeat this cycle indefinitely. (rotational coppicing) **[6]**

Benefits of coppicing:
New stems would grow more rapidly
lifespan of trees is extended
It provides variety of habitats
Fewer large trees means more light for smaller plants

(c) Many schools visit the Lake District to undertake Biology fieldwork.

A group of students investigated the biodiversity of five herb plants they found in adjacentcoppiced and mature areas of woodland in the spring of 2016.

Their results are shown in Table 18.

	Number of individuals (n)	
Species	**Coppiced**	**Mature**
Bluebell	35	46
Dog's mercury	2	12
Foxglove	5	1
Herb robert	20	4
Wood sorrel	8	4
Total	70	67

n/N	$(n/N)^2$
0.5	0.25
0.0286	8.163×10^{-4}
0.0714	5.102×10^{-3}
0.286	0.0816
0.114	0.0131
	$\Sigma = 0.35$

Table 18

(i) The students calculated the Simpson's Index of Diversity (D) for the mature area to be0.489.

Use the information in Table 18 to work out the Simpson's Index of Diversity (D) for thearea of coppiced woodland.

Use the formula: $D = 1 - \left(\Sigma\left(\frac{n}{N}\right)^2\right)$

$D = 1 - 0.35 = 0.649$

D = 0.649 **[3]**

(ii) Use the example of the students' fieldwork to explain how biodiversity can be considered at different levels.

[3]

There are two different types of habitat (coppiced and mature). This is low habitat biodiversity. The Simpson's Index value for both areas indicate biodiversity is moderate. Thus the species richness is also moderate. But the species evenness is low because there is a huge difference in the number of each species. (E.g. Bluebell and Herb robert are dominant in coppiced area)

Total Marks for Question Set 16: 17